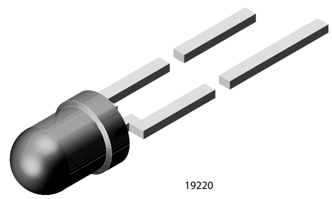
High Efficiency LED, ∅ 3 mm Tinted Undiffused Package



FEATURES

- Choice of five bright colors
- Standard T-1 package
- Small mechanical tolerances
- Suitable for DC and high peak current
- Wide viewing angle
- Luminous intensity categorized
- Yellow and green color categorized
- Lead (Pb)-free device
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb
Pb-free
e1

DESCRIPTION

The TLH.42.. series was developed for standard applications like general indicating and lighting purposes.

It is housed in a 3 mm tinted clear plastic package. The wide viewing angle of these devices provides a high on-off contrast.

Several selection types with different luminous intensities are offered. All LEDs are categorized in luminous intensity groups. The green and yellow LEDs are categorized additionally in wavelength groups.

That allows users to assemble LEDs with uniform appearance.

APPLICATIONS

- Status lights
- OFF/ON indicator
- Background illumination
- Readout lights
- Maintenance lights
- Legend light

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 3 mm
- Product series: standard
- Angle of half intensity: ± 22°

PARTS TABLE		
PART	COLOR, LUMINOUS INTENSITY	TECHNOLOGY
TLHR4200	Red, I_V > 4 mcd	GaAsP on GaP
TLHR4201	Red, I_V > 6.3 mcd	GaAsP on GaP
TLHR4205	Red, I_V > 10 mcd	GaAsP on GaP
TLHO4200	Soft orange, I_V > 4 mcd	GaAsP on GaP
TLHO4201	Soft orange, I_V > 10 mcd	GaAsP on GaP
TLHY4200	Yellow, I_V > 4 mcd	GaAsP on GaP
TLHY4201	Yellow, I_V > 6.3 mcd	GaAsP on GaP
TLHY4205	Yellow, I_V > 10 mcd	GaAsP on GaP
TLHG4200	Green, I_V > 6.3 mcd	GaP on GaP
TLHG4201	Green, I_V > 10 mcd	GaP on GaP
TLHG4205	Green, I_V > 16 mcd	GaP on GaP
TLHP4200	Pure green, I_V > 2.5 mcd	GaP on GaP
TLHP4201	Pure green, I_V > 6.3 mcd	GaP on GaP

ABSOLUTE MAXIMUM RATINGS[1] TLHR42.., TLHO42.., TLHY42..,TLHG42.., TLHP42..				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage[2]		V_R	6	V
DC Forward current		I_F	30	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	1	A
Power dissipation		P_V	100	mW
Junction temperature		T_j	100	°C
Operating temperature range		T_{amb}	- 40 to + 100	°C
Storage temperature range		T_{stg}	- 55 to + 100	°C
Soldering temperature	t ≤ 5 s, 2 mm from body	T_{sd}	260	°C
Thermal resistance junction/ ambient		R_{thJA}	400	K/W

Note:
[1] T_{amb} = 25 °C, unless otherwise specified
[2] Driving the LED in reverse direction is suitable for a short term application

Optical and Electrical Characteristics[1] tlhr42.., **red**							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity	I_F = 10 mA	TLHR4200	I_V	4	8		mcd
		TLHR4201	I_V	6.3	10		mcd
		TLHR4205	I_V	10	15		mcd
Dominant wavelength	I_F = 10 mA		λ_d	612		625	nm
Peak wavelength	I_F = 10 mA		λ_p		635		nm
Angle of half intensity	I_F = 10 mA		φ		± 22		deg
Forward voltage	I_F = 20 mA		V_F		2	3	V
Reverse current	V_R = 6 V		I_R			10	µA
Junction capacitance	V_R = 0, f = 1 MHz		C_j		50		pF

Note:
[1] T_{amb} = 25 °C, unless otherwise specified

Optical and Electrical Characteristics[1] tlhO42.., **Soft Orange**							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity	I_F = 10 mA	TLHO4200	I_V	4	10		mcd
		TLHO4201	I_V	10	18		mcd
Dominant wavelength	I_F = 10 mA		λ_d	598		611	nm
Peak wavelength	I_F = 10 mA		λ_p		605		nm
Angle of half intensity	I_F = 10 mA		φ		± 22		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse current	V_R = 6 V		I_R			10	µA
Junction capacitance	V_R = 0, f = 1 MHz		C_j		50		pF

Note:
[1] T_{amb} = 25 °C, unless otherwise specified

Optical and Electrical Characteristics[1)] tlhy42.., **yellow**							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity	I_F = 10 mA	TLHY4200	I_V	4	10		mcd
		TLHY4201	I_V	6.3	15		mcd
		TLHY4205	I_V	10	20		mcd
Dominant wavelength	I_F = 10 mA		λ_d	581		594	nm
Peak wavelength	I_F = 10 mA		λ_p		585		nm
Angle of half intensity	I_F = 10 mA		φ		± 22		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse current	V_R = 6 V		I_R			10	µA
Junction capacitance	V_R = 0, f = 1 MHz		C_j		50		pF

Note:
1) T_{amb} = 25 °C, unless otherwise specified

Optical and Electrical Characteristics[1)] tlhg42.., **green**							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity	I_F = 10 mA	TLHG4200	I_V	6.3	10		mcd
		TLHG4201	I_V	10	15		mcd
		TLHG4205	I_V	16	20		mcd
Dominant wavelength	I_F = 10 mA		λ_d	562		575	nm
Peak wavelength	I_F = 10 mA		λ_p		565		nm
Angle of half intensity	I_F = 10 mA		φ		± 22		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse current	V_R = 6 V		I_R			10	µA
Junction capacitance	V_R = 0, f = 1 MHz		C_j		50		pF

Note:
1) T_{amb} = 25 °C, unless otherwise specified

Optical and Electrical Characteristics[1)] tlhp42.., **pure green**							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity	I_F = 10 mA	TLHP4200	I_V	2.5	7		mcd
		TLHP4201	I_V	6.3		20	mcd
Dominant wavelength	I_F = 10 mA		λ_d	555		565	nm
Peak wavelength	I_F = 10 mA		λ_p		555		nm
Angle of half intensity	I_F = 10 mA		φ		± 22		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse current	V_R = 6 V		I_R			10	µA
Junction capacitance	V_R = 0, f = 1 MHz		C_j		50		pF

Note:
1) T_{amb} = 25 °C, unless otherwise specified

LUMINOUS INTENSITY CLASSIFICATION

GROUP	LUMINOUS INTENSITY (MCD)	
STANDARD	MIN	MAX
N	2.5	5.0
P	4.0	8.0
Q	6.3	12.5
R	10	20
S	16	32
T	25	50
U	40	80
V	63	125
W	100	200
X	130	260
Y	180	360
Z	240	480
AA	320	640
BB	430	860
CC	575	1150
DD	750	1500

Note:
Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of ± 11 %.
The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped on each bag (there will be no mixing of two groups in each bag).
In order to ensure availability, single brightness groups will not be orderable.
In a similar manner for colors where wavelength groups are measured and binned, single wavelength groups will be shipped on any one bag.
In order to ensure availability, single wavelength groups will not be orderable.

COLOR CLASSIFICATION

GROUP	DOM. WAVELENGTH (NM)							
	SOFT ORANGE		YELLOW		GREEN		PURE GREEN	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
0							555	559
1	598	601	581	584			558	561
2	600	603	583	586			560	563
3	602	605	585	588	562	565	562	565
4	604	607	587	590	564	567		
5	606	609	589	592	566	569		
6	608	611	591	594	568	571		
7					570	573		
8					572	575		

Note:
Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm.

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

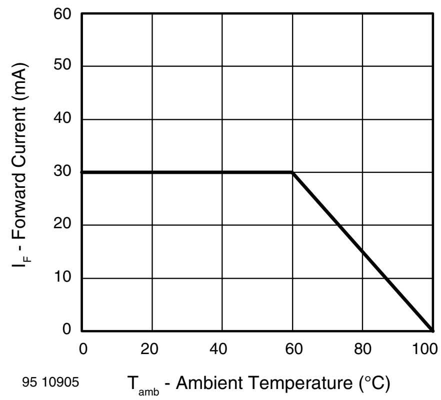


Figure 1. Forward Current vs. Ambient Temperature

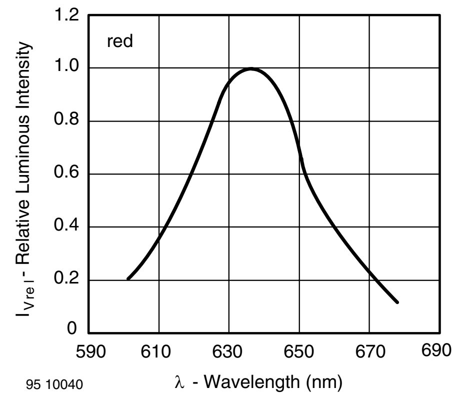


Figure 4. Relative Intensity vs. Wavelength

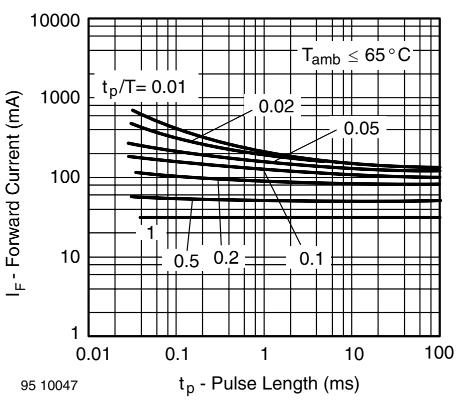


Figure 2. Forward Current vs. Pulse Length

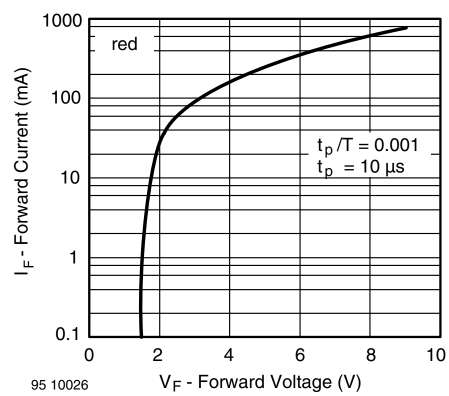


Figure 5. Forward Current vs. Forward Voltage

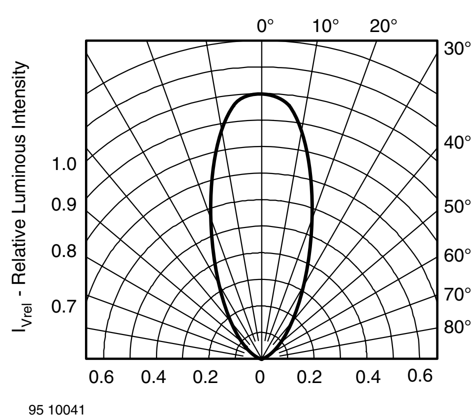


Figure 3. Rel. Luminous Intensity vs. Angular Displacement

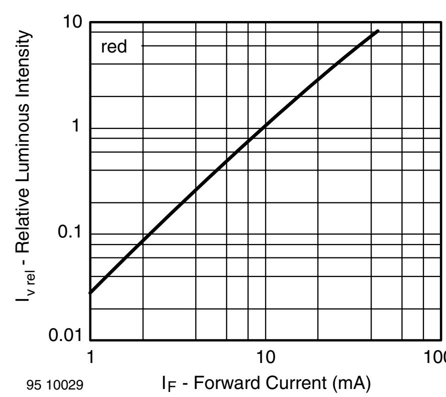


Figure 6. Relative Luminous Intensity vs. Forward Current

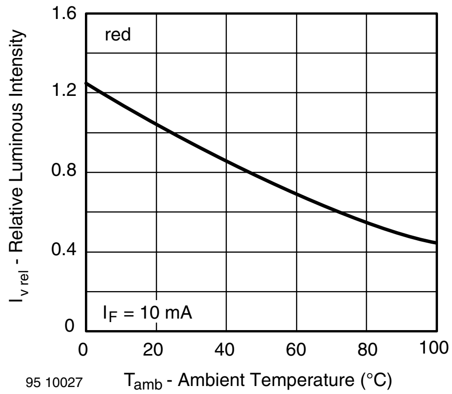


Figure 7. Rel. Luminous Intensity vs. Ambient Temperature

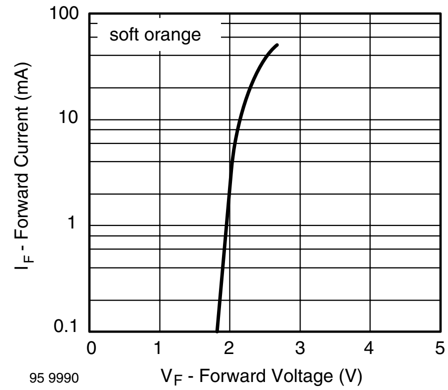


Figure 10. Forward Current vs. Forward Voltage

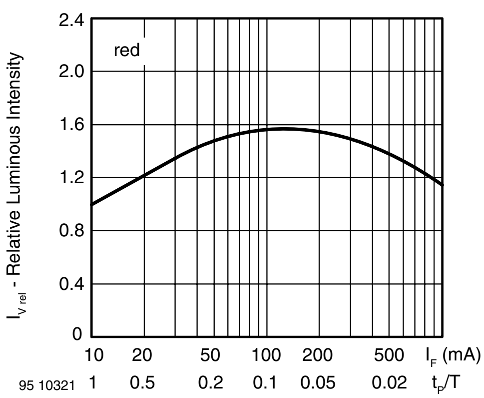


Figure 8. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

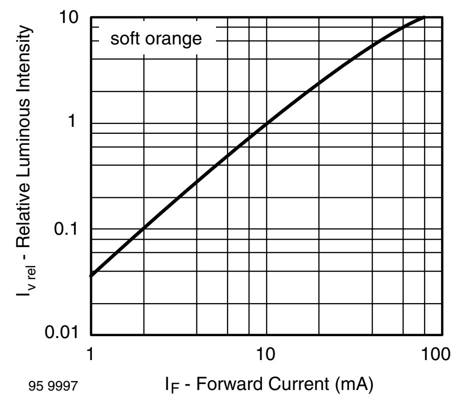


Figure 11. Relative Luminous Intensity vs. Forward Current

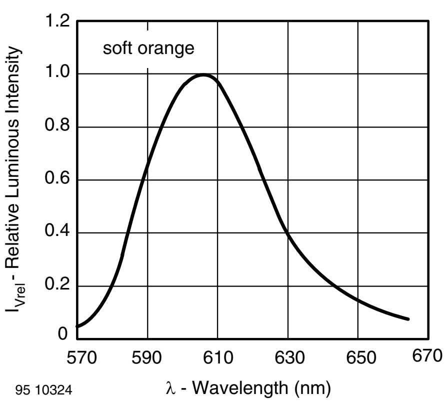


Figure 9. Relative Intensity vs. Wavelength

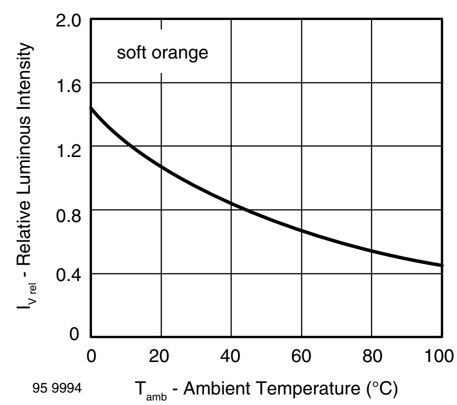


Figure 12. Rel. Luminous Intensity vs. Ambient Temperature

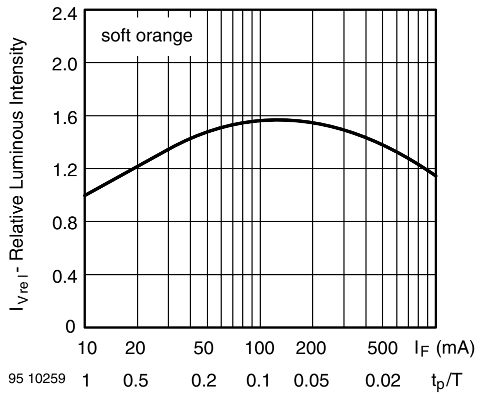


Figure 13. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

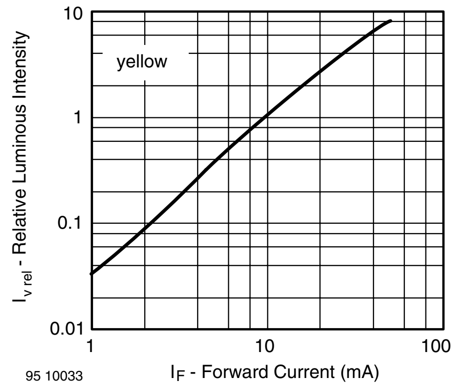


Figure 16. Relative Luminous Intensity vs. Forward Current

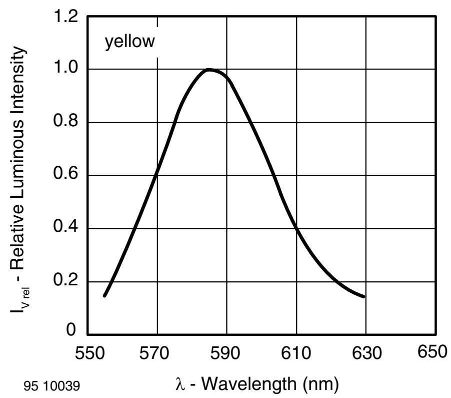


Figure 14. Relative Intensity vs. Wavelength

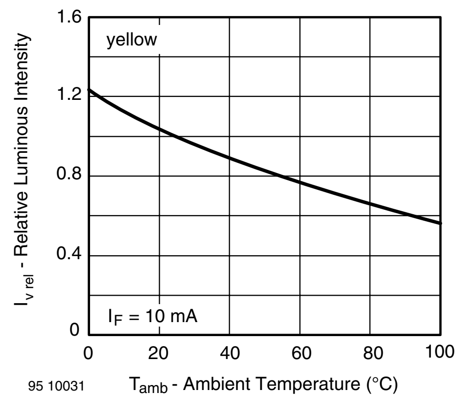


Figure 17. Rel. Luminous Intensity vs. Ambient Temperature

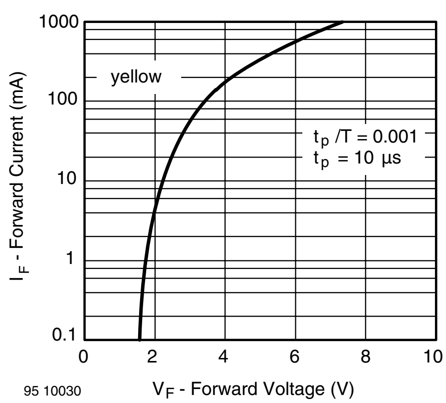


Figure 15. Forward Current vs. Forward Voltage

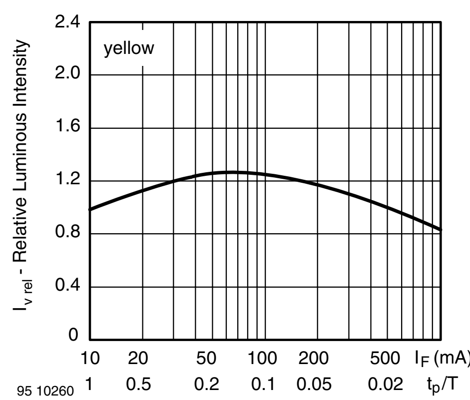


Figure 18. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

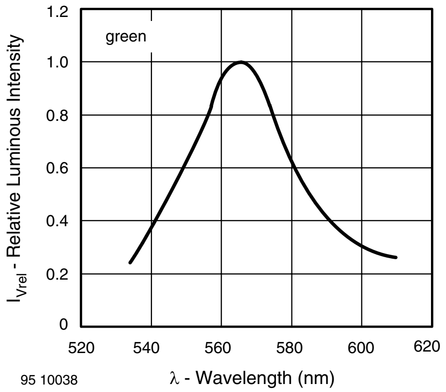


Figure 19. Relative Intensity vs. Wavelength

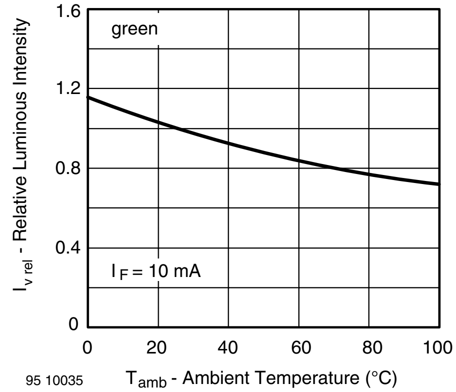


Figure 22. Rel. Luminous Intensity vs. Ambient Temperature

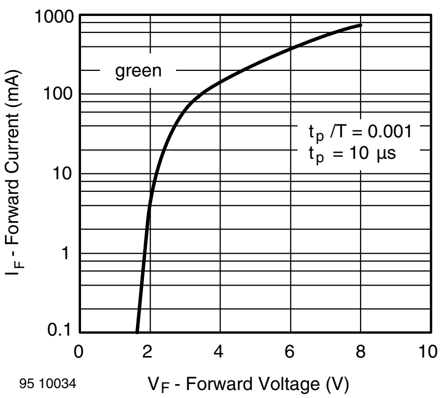


Figure 20. Forward Current vs. Forward Voltage

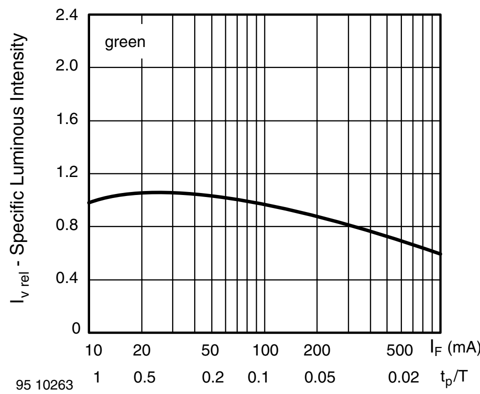


Figure 23. Specific Luminous Intensity vs. Forward Current

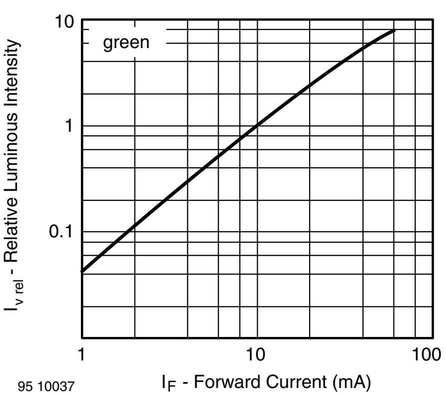


Figure 21. Relative Luminous Intensity vs. Forward Current

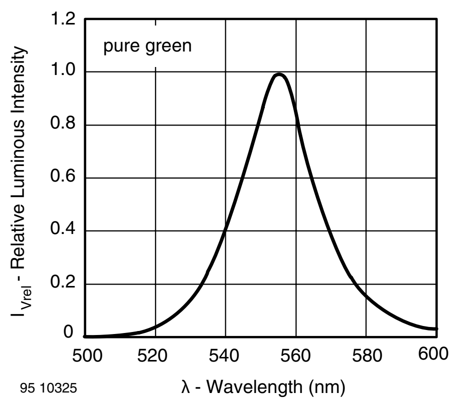


Figure 24. Relative Intensity vs. Wavelength

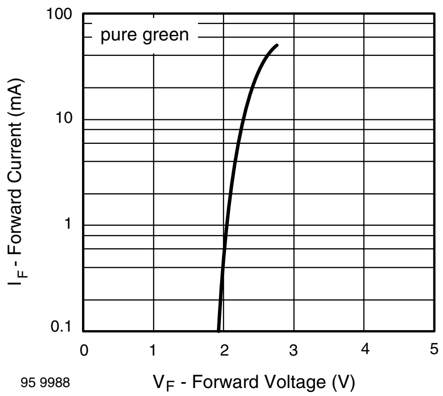


Figure 25. Forward Current vs. Forward Voltage

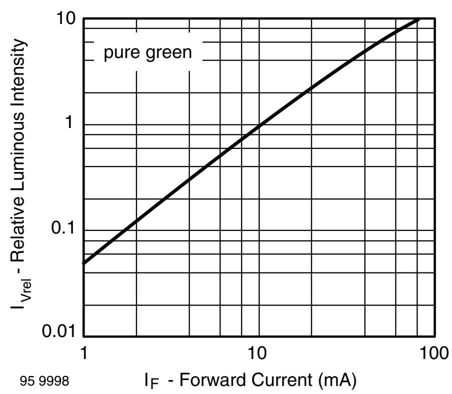


Figure 26. Relative Luminous Intensity vs. Forward Current

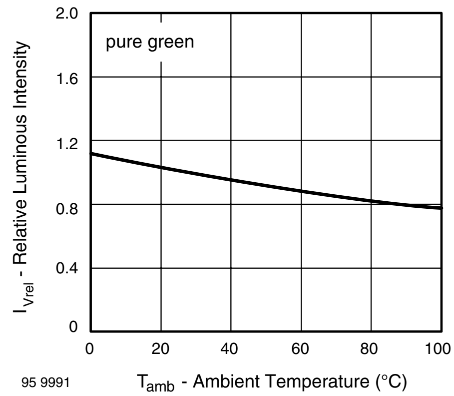


Figure 27. Rel. Luminous Intensity vs. Ambient Temperature

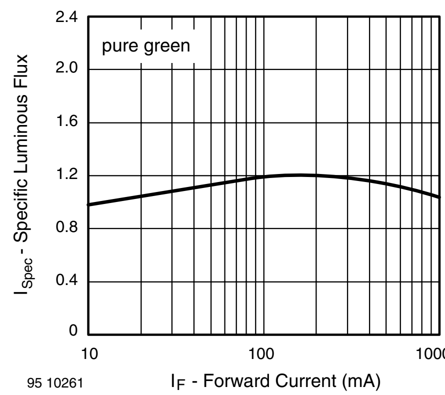
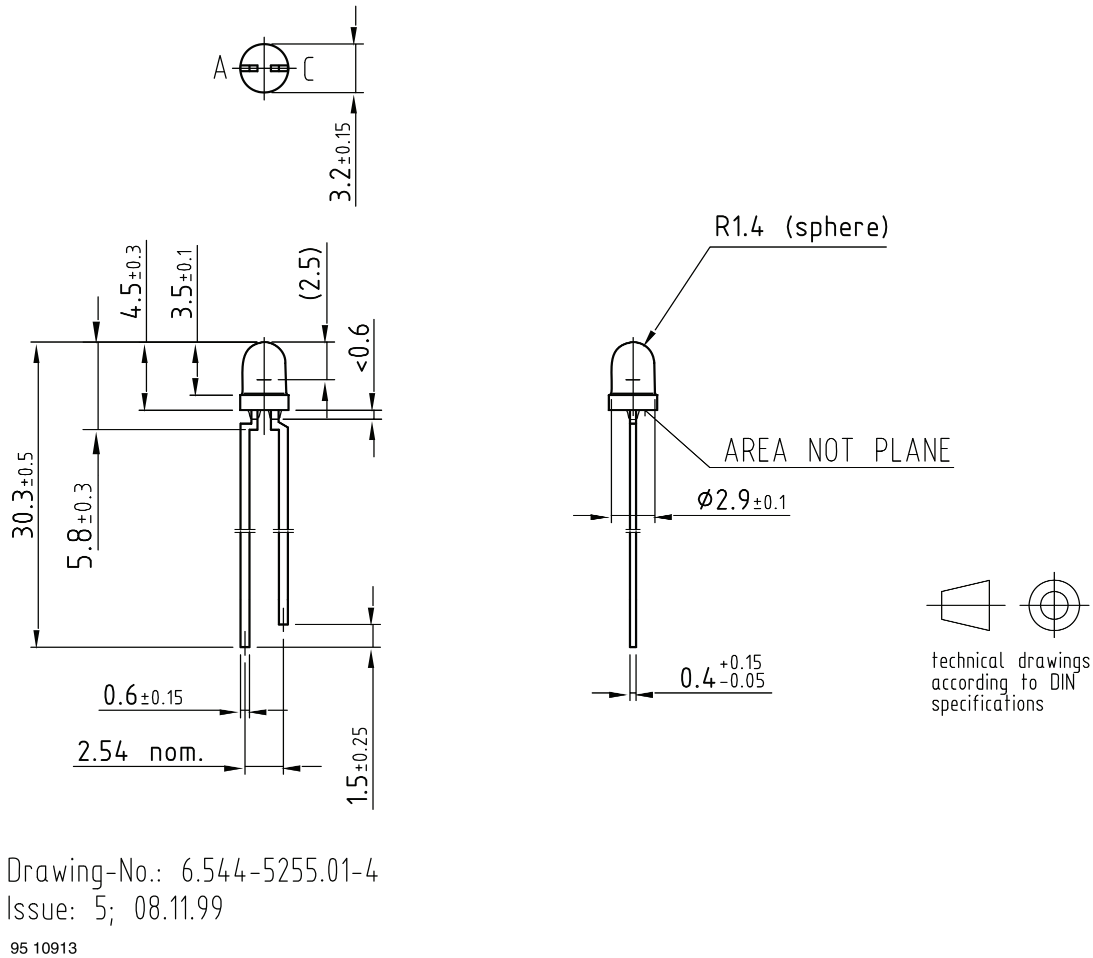


Figure 28. Specific Luminous Intensity vs. Forward Current

PACKAGE DIMENSIONS in millimeters



OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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